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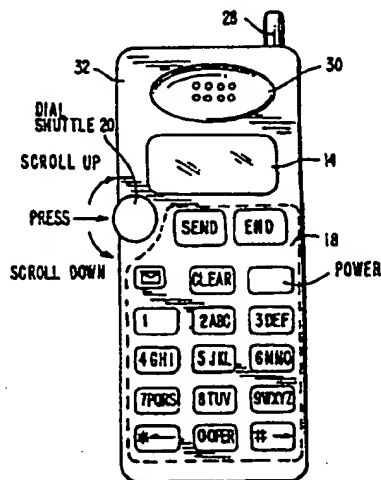
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(54) Title: COMMUNICATION TERMINAL APPARATUS AND METHOD FOR SELECTING OPTIONS USING A DIAL SHUTTLE

(57) Abstract

Cellular telephone (10) which utilizes a dial shuttle (20) for selecting functions listed in various option lists to be performed. The dial shuttle (20) is depressed by a user to call up a particular option list menu (option group) on the telephone's display (14). Upon depression of the dial shuttle (20), one of the option groups stored in memory (22, 25) that is associated with the current operating mode of the device is retrieved, wherein each of the stored option groups is associated with a respective operating mode and includes a respective plurality of functions for selection by a user during the respective operating mode. The current operating mode pertains not only to whether a telephone call is taking place but also to the number of digits that have been entered into the cellular telephone (10). The retrieved option group is displayed and the dial shuttle (20) is utilized by the user to select one of the displayed functions for execution.



Still yet a further aspect of the present invention, the option list data that corresponds to some or all of the option groups are generated.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The following detailed description, given by way of example and not intended to limit the present invention solely thereto, will best be appreciated in conjunction with the accompanying drawings, wherein like
10 reference numerals denote like elements and parts, in which:

Fig. 1 is a block diagram of the cellular telephone of the present invention;

Fig. 2 is a schematic illustration of the face
15 of a cellular telephone having a dial shuttle in accordance with the present invention;

Figs. 3A and 3B are tables used for explaining the operation of the dial shuttle during various operating modes in accordance with the present invention;

20 Fig. 4 is a schematic illustration of the display and the various functions performed by the cellular telephone of the present invention when using the dial shuttle; and

Fig. 5 schematically illustrates the face of
25 the cellular telephone in accordance with another embodiment of the present invention.

DETAILED DESCRIPTION OF CERTAIN PREFERRED EMBODIMENTS

Referring now to the drawings, Fig. 1 is a
30 block diagram of cellular telephone 10 of the present invention. As shown, cellular telephone 10 is comprised of a controller 12, a liquid crystal display (LCD) 14, an LCD driver circuit 16, input keys 18, a jog dial 20 (also identified herein as a dial shuttle), a read-only memory
35 (ROM) 22, a random access memory (RAM) 24, an electrically erasable and programmable read only memory (EEPROM) 25, a transmitting/receiving circuit 26, and an

antenna 28. Controller 12 provides the means for carrying out most of the functions of cellular telephone 10 utilizing the permanently stored operation program stored in ROM 22, using RAM 24 for storing temporary data, and using EEPROM 25 for storing programmable setting data, e.g., a phonebook. Input keys 18 and jog dial 20 in accordance with the present invention provide the means by which a user of the cellular telephone enters data and makes selections (to be further discussed). LCD driver 16 drives display 14 in response to control signals supplied from controller 12. Transmitting/receiving circuit 16 transmits and receives via antenna 28 RF signals to and from a cellular telephone base station (not shown). Since the construction and operation of transmitting/receiving circuit 26, LCD driver 16 and antenna 28 are well known in the art and form no part of the present invention, further description thereof is omitted herein, except where it is necessary for an understanding of the present invention. Also, although display 14 is described herein as being a liquid crystal display (LCD), other suitable displays may be used.

As will be further mentioned, while the present invention is described as pertaining to the operation of a cellular telephone, the present invention is not limited thereto and may easily be applied to other types of mobile devices including, but not limited to, a PCS device, a beeper, a remote control (e.g., for use with a television, a VCR, etc.), a mobile personal electronic portfolio, etc.

Fig. 2 is a schematic illustration of the "face" 32 of cellular telephone 10 of the present invention and which is shown as being comprised of input keys 18, dial shuttle 20, display 14, and a speaker 30. Also shown, while generally not on the face, is antenna 28 which may be of the "pull-out" type. Face 32 of cellular telephone 10 also may include a microphone (not

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shown) into which a user speaks, although the microphone may be provided in a separate pull-out extension of the cellular telephone or in the "flip" cover thereof. It is noted that the operation and functions of antenna 28, speaker 30 and the microphone are well known in the art and form no part of the present invention.

As shown in Fig. 2, input keys 18 include numeric input keys 0-9, a "#" key, an "*" key, a "SEND" key, an "END" key, a "CLEAR" key, and a "POWER" key. These keys exist on practically all cellular telephones and, thus, their respective functions and design are well known in the art.

Dial shuttle 20, in accordance with the present invention, is operable to be moved by the user to an up position, to a down position, or to a depressed position. Any appropriate switch that is switchable to at least three positions may be used as dial shuttle 20, but in the preferred embodiment of the present invention, dial shuttle 20 is easily moved to either the up or down positions by a user or to a depressed position, wherein the switch possibly "clicks" upon depression to notify the user of the depression thereof. Alternatively, dial shuttle 20 may be moved either to a right position or to a left position, instead of the up and down positions, but for the purpose of the description herein, dial shuttle 20 is movable only into the up position, the down position, and the depressed position.

In accordance with the present invention, dial shuttle 20 operates to scroll through various menus displayed on display 14 when the user moves dial shuttle 20 into its up or down positions, and is operable to select the particular entry in the displayed menu that is highlighted for subsequent execution by the cellular telephone when dial shuttle 20 is depressed. However, dial shuttle 20 does not simply provide for the scrolling and selection of an entry in a displayed menu, but, in accordance with the present invention, when dial shuttle

20 is moved (i.e., depressed or, alternatively, moved in any direction), a particular menu is displayed on display 14 corresponding to the current state of cellular telephone 10 (to be discussed), and the first entry that is highlighted in the displayed menu corresponds to that entry therein that has the highest frequency of use (also to be discussed).

The operation of cellular telephone 10 using dial shuttle 20 will now be discussed with reference to the Tables shown in Figs. 3A and 3B. Figs. 3A and 3B illustrate the different menus that are displayed when dial shuttle 20 is moved or depressed in the various operating modes of the cellular telephone.

Referring first to Fig. 3A, and particularly case 1 shown therein, the option list (also identified herein as an "option group") of case 1 represents the particular menu options that are displayed (or partially displayed due to the size restriction of display 14) and that may be selected when the user has already entered three or more digits in the standby mode of the cellular telephone (identified as the "context" in Figs. 3A and 3B). That is, prior to the occurrence of a call (or after the termination of a call), if the user enters a telephone number using, for example, the digit keys of keys 18 and subsequently depresses dial shuttle 20, display 14 is driven (by appropriate control signals from controller 12 and appropriate drive signals from driver 16) to display the option list (group) corresponding to case 1 shown in Fig. 3A. In an alternative embodiment, the option list of case 1 also is displayed when dial shuttle 20 is moved into its up position or its down position, as well as when it is depressed. It is noted that while the present discussion is directed to the textual display of each option group (i.e., option list), as shown in Figs. 3A, 3B and 4, each option group may be provided in the form of graphical representations of each option of the displayed option group, including the use

of icons or other graphical representations of the functions thereof.

In accordance with the present invention, the option list of case 1 includes those selectable functions that may be selected for execution for cases (i.e., the "context" of) when three or more digits have been entered into the telephone in the standby mode. For example, the specific functions that would be utilized for the case when three or more digits already have been entered in standby mode include "Find Number" which represents the function of searching for a stored telephone number that includes the entered digits, "Send" which represents the function of dialing the entered number (identical to the function of the "SEND" key), "Store" which is the function of storing the entered number into a "telephone book" (stored in, for example, EEPROM 25), "Enter Pause" which performs the function of entering a pause mark into the telephone number, "Enter Link" which represents the function of entering a link mark (the user enters the location number of the phone book to which the user wants to connect), and "Enter Hyphen" which functions to enter a hyphen "-" mark into the entered telephone number (generally for purposes of making the telephone number more readable). The option list of case 1 is exemplary and may include other functions that are used after the user enters at least three digits in the standby mode. However, and in accordance with the present invention, the option list of case 1 would not include an entry that would never be selected after the user has entered three or more digits in the standby mode. For example, a call "End" function or a mute function would not be selected except during the occurrence of a call and thus are not included in the option list of case 1.

A second mode of operation, identified as case 2 in Fig. 3A, is entered when the user has entered only one or two digits into the cellular telephone in the standby mode. In such case, the option list

corresponding to case 2 shown in Fig. 3A is displayed on display 14 when dial shuttle 20 is depressed, such option list including the selectable options of "Recall Loc#", "Send", "Store", "Enter Pause", "Enter Link", and "Enter Hyphen". The option "Recall Loc#" represents the function of recalling the telephone number from the telephone book that is stored at the entered address (i.e., from the one or two digit address entered by the user), and the other options of case 2 have been previously discussed. Comparing the option list of case 1 with that of case 2, it is seen that the selection "Recall Loc#" is not included in the option list of case 1 since the cellular telephone generally includes only 99 locations for storing user supplied telephone numbers. However, in an alternative embodiment, case 2 may represent the context of when the user has entered one, two or three digits in the standby mode, wherein cellular telephone 10 allows for the storage of more than 100 user supplied telephone numbers in more than 100 respective memory locations, and thus case 2 would allow the retrieval of a telephone number from a three-digit memory location (when "Recall Loc#" is selected).

In addition to displaying a menu (i.e., option list) having selectable options that are based on the particular operating mode or "context" of cellular telephone 10, the present invention further provides that when dial shuttle 20 is depressed the particular option that is initially selected (i.e., "highlighted" in the list, but not yet executed) corresponds to that entry in that option list that has the highest frequency of selection. In other words, and referring to case 1 of Fig. 3A, when dial shuttle 20 is depressed after the user enters at least three digits in the standby mode, the option list of case 1 is displayed and the most likely option therein (in the present case, "SEND") to be selected for execution (i.e., most chosen function) is highlighted. If the user depresses dial shuttle 20 after

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the option list is displayed, the most frequently chosen function "SEND" is executed. Thus, when the user enters three or more digits in the standby mode and depresses dial shuttle 20 two times in a row, the "Send" function
5 is performed, wherein the option list of case 1 is displayed after dial shuttle 20 is depressed the first time and the highlighted function (in this case, "Send") is performed when dial shuttle 20 is depressed the second time.

10 When the user wants to select another function other than "Send" (after the first-time depression of dial shuttle 20),
the user moves dial shuttle 20 in either its up position or its down position in order to "scroll" through the
15 option list. During such scrolling, a different option is highlighted each time dial shuttle 20 is moved up or down, wherein the selection above the highlighted option is highlighted (and the previously highlighted option becomes not highlighted) when dial shuttle 20 is moved
20 up, and the option below the highlighted option becomes highlighted when dial shuttle 20 is moved down. In accordance with the present invention, in addition to initially highlighting (i.e., selecting) the most frequently selected option when an option list is
25 displayed, the present invention further provides that the options in the displayed option list above and below the initially highlighted option correspond to the second-most and third-most frequently selected functions in the particular operating mode of cellular telephone 10
30 (i.e., for the particular case). For example, and still referring to case 1 of Fig. 3A, the functions "Find Number" and "Store" (which are positioned adjacent to the first-highlighted option "Send") represent those
functions that the user is next likely to select (after
35 "Send"). Thus, to perform either the second or third-most selected functions during a particular case (operating mode) the user only needs to depress dial

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shuttle 20 a first time (to bring up the option list), followed by a single up or down motion of dial shuttle 20 to select the second or third-most used function, followed by a second-time depression of dial shuttle 20 to carry out execution of the selected option. Similarly, the fourth and fifth-most selected options are located adjacent to the second and third (or third and second) most selected options, respectively, and so on. Thus, while there may be between, for example, two and ten options in each option list, generally only one or two up or down motions of dial shuttle 20 are necessary to select a desired function to be performed. Of course, and as previously discussed, up or down motion of dial shuttle 20 is not necessary to perform the most frequently used function in each of the option lists, which are executed simply by depressing dial shuttle 20 two times in a row.

Cellular telephone 10 of the present invention also includes other option lists that are displayed when dial shuttle 20 is depressed during other operating modes ("operating mode" including the number of entered digits as well as whether the telephone is in the standby mode or the call mode). The other option lists correspond to cases 3-11 shown in Figs. 3A and 3B and these cases and their corresponding option lists are further discussed below. But before the descriptions of cases 3-11 are provided, a detailed discussion of the operation of dial shuttle 20 will be described with reference to Fig. 4.

Fig. 4 is a schematic illustration of the various displays of display 14 and operations of cellular telephone 10 when dial shuttle 20 is utilized after the user has entered at least three digits in the standby mode (i.e., case 1). As shown, display 40 represents what is displayed in display 14 (Fig. 2) when the user has entered three or more digits in the standby mode and subsequently moves dial shuttle 20 into its depressed position (represented by "Press DS" instruction 41 in

Fig. 4). In one embodiment of the present invention, display 14 includes four text lines in which textual information are provided. Display 14 may also include other lines in which other types of information are displayed including, for example, signal strength, strength of battery, etc. The first text line includes the word "OPTIONS" to indicate that an option menu is being displayed, and the second through fourth lines include three of the options of the selected option list. Thus, and as shown in display (or image) 40, the options that are displayed after dial shuttle 20 is depressed are "Find Number", "Send", and "Store". In addition, the first option highlighted, or, in the alternative embodiment of the display shown in Fig. 4, that includes a ">" adjacent thereto, is "Send" (as indicated by the arrow cursor ">"). At this point, the user may depress dial shuttle 20 in order to make a call, move dial shuttle 20 down in order to highlight "Store" (display 42), or move dial shuttle up to highlight "Find Number" (display 50). As shown in either of displays 42 or 50, moving dial shuttle 20 up or down causes the option list to be scrolled, but for readability purposes, the "highlighted" option is provided in the middle of the three displayed options. Then, when, for example, "Store" is "highlighted" (display 42), the user may depress dial shuttle 20 to carry out the function of storing the entered number into the telephone book, or move dial shuttle 20 up or down again in order to select a different option. Therefore, displays 40, 42, 44, 46, 48 and 50 represent what is displayed in display 14 as dial shuttle 20 is moved up or moved down thus scrolling up or scrolling down the particular option list. The other option lists, shown in Figs. 3A and 3B, corresponding to cases 2-11, are scrolled in a similar manner using dial shuttle 20.

Referring again to Fig. 3A, case 3 therein represents the operating mode of cellular telephone 10

when the user enters three or more digits during the occurrence of a call (identified herein as "in call mode"). When dial shuttle 20 is depressed in this operating mode, the option list that is displayed (or
5 partially displayed) includes the options "Mute", "Send", "Store", "Number Tone", "Find Number", "Enter Pause", "Enter Link", and "Enter Hyphen". The option "Mute" represents the function of muting the microphone during the call, the option "Number Tone" represents the
10 function of sending a DTMF tone, and the other options of case 3 have been previously discussed. Therefore, the option list of case 3 represents those functions that the user may want to perform during a call and after three or more digits are entered into cellular telephone 10.
15 Still further, the first highlighted option "Send" and the adjacent options thereto of "Mute" and "Store" represent the most frequently selected functions during this particular operating mode.

The fourth mode of operation, identified as
20 case 4 in Fig. 3A, is entered when the user inputs only one or two digits in the call mode. During this operating mode, the option list that is displayed when dial shuttle 20 is depressed includes "Mute", "Send", "Store", "Number Tone", "Recall Loc#", "Pause", "Enter
25 Link", and "Enter Hyphen".

The fifth mode of operation is shown as case 5 in Fig. 3B, and the option list of case 5 is displayed when the user has recalled a number from the telephone book in the standby mode and subsequently depresses dial
30 shuttle 20. The option list for case 5 includes "Erase", "Send", "Edit", "Restriction", and "View Number". Unlike previously described cases 1-4, the option list of case 5 includes the functions "Erase" which erases the displayed number from the phone book, "Edit" which allows the user
35 to edit the displayed number in the telephone book, "Restriction" which restricts the number in the phone book to particular persons and is achieved, for example,

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by requiring the user to enter a password (e.g., a user-supplied password) to access the restricted number, and "View Number" which displays the "Overflow" digits that previously are not displayed due to the restricted digit length of display 14.

Case 6, shown in Fig. 3B, represents the sixth mode of operation and occurs when the user has recalled a number from the telephone book in call mode, and the option list for case 6 includes "Mute", "Send", "Edit", "Erase", "Restriction", "View Number", and "Number Tone".

The seventh mode of operation, case 7 in Fig. 3B, represents when the user has recalled a number using a call history function in the standby mode, and when dial shuttle 20 is depressed. The option list that is displayed includes "Store", "Send", "Duration", "Time/Date", "View Number", "Erase", and "Number Tone". The function "Duration" displays the length (e.g., minutes, seconds) of the previous telephone call that was displayed from a "Call History" function, and the function "Time/Date" displays the time and date at which the displayed call was made.

The next mode of operation, case 8 in Fig. 3B, represents when the user recalls a telephone number from "Call History" in call mode, and the option list displayed for this case includes "Mute", "Send", "Store", "Duration", "Time/Date", "View Number", "Erase", and "Number Tone".

The next mode of operation, represented by case 9 in Fig. 3B, represents when the user enters a number into the scratch pad (in a scratch pad mode) in standby mode, and the option list for case 9 includes "Enter Pause", "Store", "Enter Link", and "Enter Hyphen".

The tenth mode of operation, shown as case 10, represents when the user enters a number into the scratch pad in call mode, wherein the option list for this case

includes "Mute", "Store", "Enter Pause", "Enter Link", "Enter Hyphen", and "Number Tone".

The eleventh mode of operation, shown as case 11, represents when a call back number in SMS (Short Message Service) /VMA (Voice Mail Alert) is displayed, and the option list for this case includes "Send" and "Store".

As seen from the above description of the various modes of operation of cellular telephone 10, corresponding to cases 1-11 shown in Figs. 3A and 3B, it is seen that "custom-like" option lists for every particular type of operating mode (which takes into account the entered number of digits) are provided simply by depressing dial shuttle 20. Still further, each option list is ordered in such a manner so that the first highlighted option represents that function (in the particular option list) that is most frequently selected by the user and those options adjacent thereto are next most frequently selected by the user. It is noted, however, that cases 1-11 shown in Figs. 3A and 3B are not the only operating modes of cellular telephone 10, and the options in each of the option lists disclosed and described herein may include additional user selectable functions including, for example, the above-mentioned "Call History" function.

Fig. 5 is a schematic illustration of the face 61 of cellular telephone 60 in accordance with another embodiment of the present invention. As shown, cellular telephone 60 is substantially similar to the above-described cellular telephone 10, except face 61 does not include the "SEND" and "END" keys. Since the option lists may include the function "Send", as previously discussed, and the particular option lists displayed for cases in call mode may include the option "End", the "SEND" and "END" keys may be removed from the face of the cellular telephone without making the operation thereof more difficult. In this embodiment, and also in the